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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/806,875  
Filing Date: March 23, 2004  
Appellant(s): SUMANAWEEERA ET AL.

\_\_\_\_\_  
Rosa S. Kim, Reg. No. 37,728  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 03/11/2008 appealing from the Office action mailed 08/08/2007.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

20050107704	Von Behren	5-2005
20050096543	Jackson	5-2005
20050203395	Sui	9-2005
6673017	Jackson	1-2004
6193660	Jackson	2-2001
6117081	Jago	9-2000

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

1. *The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:*

*(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.*

2. *Claims 1-4, 7, and 12-13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Von Behren et al. (PGPub. No. 2005/0107704).*

*Von Behren et al. '704 teaches a method for detecting breathing cycle information with ultrasound, the method comprising: Obtaining ultrasound data acquired over a period of time (abstract); and determining at least a first portion of a cycle as a function of the ultrasound data [0019; 0034]; displaying a cycle waveform overlay comprising the first portion [0019]. Von Behren et al. '704 also teaches that the*

*ultrasound data is responsive to contrast agents [0022]. Von Behren et al. '704 also teaches determining a first portion of a cycle as a function of ultrasound data,  $I(t)$  [0025]. Von Behren et al. '704 also teaches determining motion relative to a reference frame of data for corresponding anatomical parts [0010; 0032]. Von Behren et al. '704 further teaches identifying cyclic parameters for a plurality of spatial locations and matching a sine wave to the variation of values [0024-0025].*

*Von Behren et al. '704 does not expressly teach that the method is for detecting a breathing cycle information and displaying the breathing cycle waveform. However, the invention of Von Behren et al. '704 would perform equally well for measuring breathing cycle information because cycle information is detected through acoustic intensities [0025]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Von Behren et al. '704 to monitor breathing cycle information to improve the utility of the method.*

3. *Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Von Behren et al. '704 in view of Jackson et al. (PGPub No. 2005/0096543).*

*Von Behren et al. '704 teaches all the limitations of the claimed invention except for expressly teaching that the method comprises determining a cost function value as a function of time, the cost function value associated with motion between a plurality of frames of data.*

*In the same field of endeavor, Jackson et al. '543 teaches determining a cost function value as a function of time, the cost function value associated with motion between a plurality of frames of data [abstract; 0006].*

*It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Von Behren et al. '704 with the cost function determination to find the position of a region of interest in a second frame as taught by Jackson et al. '543. The motivation to modify Von Behren et al. '704 in view of Jackson et al. '543 would have been to determine sufficiently matched data between frames, as taught by Jackson et al. '543 (abstract).*

4. *Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Von Behren '704 in view of Sui et al. (PGPub. No. 2005/0203395).*

*Von Behren '704 teaches all the limitations of the claimed invention except for expressly teaching that the method comprises identifying one of a peak and minimum of the breathing cycle.*

*In the same field of endeavor Sui et al. '395 teaches identifying one of a peak and minimum of a periodic cycle (claim 21).*

*It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Von Behren '704 with the identification of one of a peak and a minimum of the periodic cycle as taught by Sui et al. '395. The motivation to modify Von Behren '704 with Sui et al. '395 would have been to establish reliable frames of reference that correspond to end points in the periodic cycle.*

5. *Claims 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Von Behren '704 in view of Jackson (U.S. Patent No. 6,673,017).*

*Von Behren '704 teaches all the limitations of the claimed invention except for expressly teaching that the method comprises determining the first portion as a function of a first reference frame of ultrasound data and a first subsequent frame of ultrasound data and repeating the step of determining the first portion as a function of a first reference frame of ultrasound data and a first subsequent frame of ultrasound data with a second reference frame of ultrasound data associated with the reoccurrence of the first portion.*

*In the same field of endeavor, Jackson '017 teaches a method that comprises determining the first portion as a function of a first reference frame of ultrasound data and a first subsequent frame of ultrasound data (col. 6, lines 10-13); identifying reoccurrence of the first portion of the breathing cycle (col. 5, lines 53-67); and repeating the step of determining the first portion as a function of a first reference frame of ultrasound data and a first subsequent frame of ultrasound data with a second reference frame of ultrasound data associated with the reoccurrence of the first portion (col. 6, lines 10-13).*

*It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Von Behren '704 with the method for identifying of a portion of a physiological cycle and subsequent reoccurrences of the portion relative to multiple frames of reference as taught by Jackson '017. The motivation to modify Von Behren*

*'704 in view of Jackson '017 would have been to allow the device to use the most current data when predicting physiological cycle movements.*

6. *Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Von Behren '704 in view of Jackson et al. (U.S. Patent No. 6,193,660) and further in view of Jackson '017.*

*Von Behren '704 teaches all the limitations of the claimed invention except for expressly teaching repeating determining a first portion of a breathing cycle as a function of the ultrasound data for each cycle of the breathing cycle with a different reference frame for each breathing cycle; and wherein determining a first portion of a breathing cycle as a function of the ultrasound data comprises tracking motion for each breathing cycle as a function of the reference frame for each breathing cycle.*

*In the same field of endeavor, Jackson et al. '660 teaches tracking motion for each breathing cycle as a function of the reference frame (col. 1, lines 6-10). Jackson et al. '660 also teaches repetitively determining at least a portion of a periodic cycle as a function of the ultrasound data with a different reference frame for each cycle (col. 4, lines. 32-36; col. 7, lines 58-67; col. 8, lines 1-9).*

*Jackson et al. '660 does not expressly teach that the step of determining at least a first portion of a breathing cycle as a function of the ultrasound data comprises tracking motion for each breathing cycle as a function of the reference frame for each breathing cycle.*

*In the same field of endeavor, Jackson '017 teaches a method that includes repetitively determining at least a first portion of a physiological cycle as a function of the ultrasound data with a different reference frame for each breathing cycle (col. 6, lines 43-67; col. 7, lines. 1-5). Jackson '017 further teaches a step of determining at least a first portion of a breathing cycle as a function of the ultrasound data that comprises tracking motion for each breathing cycle as a function of the reference frame for each breathing cycle (col. 5, lines 47-49; col. 6, lines 10-13).*

*It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Von Behren '704 in view of Jackson et al. '660 and Jackson '017. The motivation to modify Von Behren '704 in view of Jackson et al. '660 and Jackson '017 would have been to provide a system that would continuously update a reference frame to account for various transducer movements, as well as, allow the system to predict physiological cycle movements based on the current physiological cycle.*

7. *Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Von Behren '704 in view of Jackson et al. '660 and Jackson '017 as applied to claim 10 above, and further in view of Jago et al. (U.S. Patent No. 6,117,081).*

*Von Behren '704 in view of Jackson et al. '660 and Jackson '017 teaches all the limitations of the claimed invention except for expressly teaching that the system comprises morphing frames of ultrasound data within each breathing cycle as a function of the reference frame for each breathing cycle.*

*In the same field of endeavor, Jago et al. '081 teaches a system that comprises morphing frames of ultrasound data within each breathing cycle as a function of the reference frame for each breathing cycle (col. 5, lines 12-33). Here the examiner is interpreting the limitations the claim to be met because Jago et al. '081 teaches warping or morphing frames to match a reference frame (col. 5, lines 12-33).*

*It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jackson et al. '660 in view of Jackson '017 with the frame morphing to a reference frame for the corresponding physiological cycle as taught by Jago et al. '081. The motivation to modify Jackson et al. '660 in view of Jackson '017 with Jago '081 would have been to allow congruent features to be registered between temporally different frames, as taught by Jago et al. '081 (col. 5, lines 12-33).*

8. *Claims 16-17 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson et al. '660 in view of Jackson '017.*

*Jackson et al. '660 teaches a method for detecting a cycle with ultrasound data, the method comprising: tracking motion of a plurality of frames of ultrasound data with respect to a reference frame of ultrasound data (col. 6, lines 57-66); calculating a cyclic parameter as a function of the tracked motion (col. 6, lines 57-65); identifying a portion of the cycle as a function of the cyclic parameter (col. 6, lines 57-62; col. 8, lines 7-9). Jackson et al. '660 also teaches resetting the reference frame of data for each of the plurality of subsequent cycles (col. 6, lines 53-56). Jackson et al. '660 also teaches*

*tracking the motion as a function of a plurality of local regions (col. 7, lines 4-6). Jackson also teaches tracking motion in B-mode frames of data (col. 2, lines 64-66).*

Jackson et al. '660 does not expressly teach repeating for each of a plurality of subsequent cycles the steps of tracking motion of a plurality of frames of ultrasound data with respect to a reference frame of ultrasound data; calculating a cyclic parameter as a function of the tracked motion for each of the plurality of subsequent cycles and identifying a first portion of the cycle as a function of the cyclic parameter for each of the plurality of subsequent cycles. Jackson et al. '660 also does not expressly teach resetting the reference frame of data for each of the plurality of subsequent cycles as a first frame of ultrasound data corresponding to the first portion of the cycle.

In the same field of endeavor, Jackson '017 teaches repeating the steps of tracking the motion of a plurality of frames of ultrasound data with respect to a reference frame of ultrasound data (col. 5, lines 47-50); calculating a cyclic parameter as a function of the tracked motion (col. 6, lines 43-49); for a plurality of subsequent cycles (col. 6, lines 43-47). Jackson '017 also teaches resetting the reference frame of data for each of the plurality of subsequent cycles as a first frame of ultrasound data corresponding to the first portion of the cycle (col. 6, lines 10-13). Jackson '017 also teaches identifying the first portion in a breathing cycle (col. 6, lines 10-13).

*It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jackson et al. '660 with the method that includes resetting the reference frame of data for each of a plurality of subsequent cycles of Jackson '017. The motivation to modify Jackson et al. '660 with Jackson '017 would have been to*

*provide a system that would update reference frame data to provide motion comparisons that are based on the most recent physiological cycle.*

9. *Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson et al. '660 in view of Jackson '017 as applied to claim 16 above, and further in view of Jackson et al. '543.*

*Jackson et al. '660 in view of Jackson '017 teaches all the limitations of the claimed invention except for expressly teaching that the system comprises calculating a cost as a function of an amount of motion of each of the plurality of frames of ultrasound data relative to the reference frame of data.*

*In the same field of endeavor, Jackson et al. '543 teaches a system comprises calculating a cost as a function of an amount of motion of each of the plurality of frames of ultrasound data relative to the reference frame of data [abstract; 0006].*

*It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jackson et al. '660 in view of Jackson '017 with the cost function determination to find the position of a region of interest in a second frame as taught by Jackson et al. '543. The motivation to modify Jackson et al. '660 in view of Jackson '017 with Jackson et al. '543 would have been to determine sufficiently matched data between frames, as taught by Jackson et al. '543 (abstract).*

10. *Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson et al. '660 in view of Jackson '017 as applied to claim 16 above, and further in view of Jago et al. (U.S. Patent No. 6,117,081).*

*Jackson et al. '660 in view of Jackson '017 teaches all the limitations of the claimed invention, including resetting the reference frame for each corresponding cycle (Jackson '017: col. 6, lines 10-13). Jackson et al. '660 in view of Jackson '017 does not expressly teach that the system further comprises morphing frames of data for each cycle relative to the reset reference frame of data.*

*In the same field of endeavor, Jago et al. '081 teaches a system that comprises morphing frames of data for each cycle relative to a reference frame (col. 5, lines 12-33). Here the examiner is interpreting the limitations the claim to be met because Jago et al. '081 teaches warping or morphing frames to match a reference frame (col. 5, lines 12-33).*

*It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jackson et al. '660 in view of Jackson '017 with the frame morphing to a reference frame for the corresponding physiological cycle as taught by Jago et al. '081. The motivation to modify Jackson et al. '660 in view of Jackson '017 with Jago et al. '081 would have been to provide a clearer image that would avoid the smearing effects due to errors in motion estimation, as taught by Jago et al. '081 (col. 5, lines 12-33).*

**(10) Response to Argument**

With regard to claims 1 and 12, Appellant repeatedly alleges that the disclosure of Von Behren, et al. does not teach or suggest the feature of the current invention, **"displaying a breathing cycle waveform"**. The Examiner first notes paragraph 0016 in the current specification. Here, a cycle is set forth as including a breathing cycle or cardiac cycle, which is detected from ultrasound data (0016). Furthermore, the current invention's transducer 14 is not set forth as having any additional structure or method step during its use that would in any preclude transducer 14 from acquiring *just* cardiac data (see 0019). Therefore, the Examiner stands that the recitation of *a breathing cycle* in the claims does not differentiate the claims from the related prior art that involves other physiological cycles. Again, this is because the current specification discloses multiple types of cycles at 0019 and the transducer 14 for acquiring the data is not claimed or disclosed as having structure that limits it to acquiring only *breathing cycle* data. Therefore, the Examiner stands that Von Behren would perform equally well for measuring and displaying breathing cycle information because the cycle information is detected through acoustic intensities 28 and acoustic phase 22 Von Behren: 0025]. That is, holding the current transducer 14 in one position to repetitively scan a substantially same region [0019] and the acquisition of ultrasound data to acquire several frames representing different times within a physiological cycle [Von Behren: 0022-0023] are not distinct processes. Thus, because the present application uses a generic means for acquiring and displaying cycle data, where the cycle data is defined

within the present application as including a breathing cycle or cardiac cycle, the Examiner stands that this limitation does not differentiate the present application nor exclude the teachings of Von Behren.

With further regard to the *displaying* of the cycle, the Examiner notes reference 25 of Von Behren. This reference is a "matched sinusoid" (see Von Behren: Figs.4-6). Furthermore, in act 24 of Von Behren, a plurality of images is displayed: Each of the images is associated with a specific time interval within the physiological cycle, where the image includes phase information. For example, a sequence of two-dimensional images is generated with at least one component of one or more pixels modulated as a function of the phase information. Anatomical reference information may be provided by superimposing the phase information of the average or DC component (see Von Behren: 0031-0032).

**Regarding the rejection of independent claim 2**, Appellant first sets forth allegations that Von Behren, who teaches the acquisition of physiological cycle data including cardiac cycles (0021-0022), does not teach or suggest a breathing cycle. In response to Appellant's *breathing cycle* allegation, the Examiner stands that this allegation has been addressed in the Examiner's response to Appellants arguments regarding claims 1 and 12 (see above).

Appellant goes on, asserting that contrast agent imaging is used in regard to the circulatory system, i.e., the heart cycle, not a breathing cycle. First, the Examiner asserts that the limitation, "obtaining ultrasound data over a period of time and

responsive to contrast agent" is not limited to requiring of contrast agent, but rather acquiring of ultrasound data that is capable of being responsive to contrast agents. That is, the claimed "and responsive to contrast agents" does not positively set forth the use of contrast agents. Furthermore, as noted in the 08/08/2007 Final Rejection, Von Behren teaches obtaining ultrasound data that is responsive to contrast agents (Von Behren: 0022). Accordingly, Claim 2 stands rejected.

**Regarding the Rejection of Independent Claim 7,** Appellant first alleges that Von Behren, et al. does not teach or suggest, "*determining at least a first portion of a breathing cycle as a function of the ultrasound data*" and "*identifying the first portion...*". The Examiner stands that the claim language relied on by the Appellant arbitrarily identifies "a first portion". That is, the claim is absent any supporting steps or structure for performing the identifying of, for example, a particular "*first portion of a breathing cycle*", instead merely claiming "*identifying a first portion of a breathing cycle*". This "identifying a first portion..." carries no patentable weight because any portion of a repeating cycle can be arbitrarily identified as the *first portion*. Furthermore, Von Behren teaches acquiring cyclically varying ultrasound data, which is representative of a repeating physiological cycle, using the same phase/amplitude analysis and hardware for displaying the tracked data as the presently claimed invention and, therefore, is capable of identifying a first portion (Von Behren: 0023-0027; Fig. 4-6). Also, Von Behren discloses multiple instances of identifying a first portion of a cycle as a function of a trend in the cycle, including but not limited to: "the phase of the represented spatial

location at the beginning of the heart cycle is about 90 degrees" (Von Behren: 0031-0032), or the time intensity curve of the ultrasound data can be mathematically represented by an equation (Von Behren: Eq. 1), where the equation is used to match a sinusoid having a period that is approximately equal to the time period of the heart cycle (Von Behren: 0023-0027; Figs. 4-6).

Appellant goes on, setting forth the allegation that Von Behren, who teaches the acquisition of physiological cycle data including cardiac cycles (0021-0022), does not teach or suggest a breathing cycle. In response to Appellant's breathing cycle allegation, the Examiner stands that this limitation has been addressed in the Examiner's response to Appellants arguments regarding claims 1 and 12 (see above).

**Regarding the Rejection of Independent Claim 16**, Appellant first alleges that the Combination of Jackson '660 and Jackson '017 does not disclose or suggest *"calculating a cyclic parameter as a function of the tracked motion"*. The Examiner stands that Jackson '660 does, in fact, teach that particular limitation (*col. 6, lines 57-62; col. 8, lines 7-9*). The 08/08/2007 Final Rejection had cited Jackson '660 for the teachings of identifying a correlation value 62, where processor 32 uses a set of ultrasound data to correlate the data with any subsequent or previous frames (*col. 6, ll. 36-65*). Jackson '660 goes on, teaching that the position estimates, which are determined by the correlation value, are used to estimate cyclical movement associated with a heart or respiration cycle (*col. 8, ll. 3-9*). The Examiner also notes that the present specification defines a cyclic parameter as a waveform or a cost function, where

a cost is calculated as a function of an amount of motion of each of a plurality of frames of data relative to a reference frame of data [0040]. Jackson '660 also defines the calculation of correlation values as a cost function (col. 10, ll. 1-5). Therefore, the examiner stands that the calculation of a correlation value as a function of tracked motion of Jackson '660 (col. 3, ll. 3-10; col. 6, ll. 36-65; col. 7, l. 58- col. 8, l. 9; col. 10, ll. 40-64) is an equivalent to the claimed *"calculating a cyclic parameter as a function of the tracked motion"*.

Appellant further alleges that the Combination of Jackson '660 and Jackson '017 does not disclose or suggest *"identifying a first portion of the cycle as a function of the cyclic parameter"*. In response to Appellant's allegation regarding *identifying a first portion*, the Examiner stands that the claim language relied on by the Appellant arbitrarily identifies "a first portion". That is, the claim is absent any supporting steps or structure for performing the identifying of, for example, a particular *"first portion of a breathing cycle"*, instead merely claiming *"identifying a first portion of a breathing cycle"*. This *"identifying a first portion..."* carries no patentable weight because any portion of a repeating cycle can be arbitrarily identified as the *first portion*. However, the 08/08/2007 Final Rejection had cited both Jackson '660 and Jackson '017 for the teachings of identifying a portion of a cycle. Jackson '660 teaches identifying a portion of the cycle as a function of the cyclic parameter (col. 4, ll. 50-65; col. 6, lines 57-62; col. 8, lines 7-9). Here, step 62 identifies a correlation value which identifies the ROI, determined at step 60, in the subsequent images as a function of the correlation (col. 4, ll. 59-65). Therein and elsewhere Jackson '017 makes multiple disclosures of calculating a correlation

value over a series of frames (col. 10, ll. 8-16, 40-47), not just the alleged "one frame of data to another frame of data". Also, Appellant's allegation that "the estimation of motion disclosed by Jackson, et al. '660 is based on mere triggering, not the correlation of frames" is invalid because the triggering is a product of the past estimates to motion, which were determined by correlation values. Furthermore, the second reference, Jackson '017 also teaches identifying a portion of a cycle, even a first portion of a cycle (col. 6, ll. 10-13, 42-60; col. 7, l. 53. col. 8, l. 7). Appellant alleges with regard to Jackson '017, that the determining portions of physiological cycles using ECG is not the same as identifying a first portion of a cycle as a function of a cyclic parameter that was calculated from tracked motion of frames. This allegation assumes that ECG is the only means that that Jackson '017 determines portions of a cycle. However, Jackson '017 makes it very clear that the use of ECG is optional and that the cyclic parameter may be determined by the ultrasound data ( col. 3, ll. 5-9; col. 4, ll. 49-56; col. 5, ll. 26-35; col. 6, ll. 43-51; col. 8, ll. 58-67; col. 9, ll. 10-35).

Appellant further alleges that the Combination of Jackson '660 and Jackson '017 does not disclose or suggest "*resetting the reference frame of data for each of the plurality of subsequent cycles as a first frame of ultrasound data corresponding to the first portion of the cycle*". Appellant goes on, stating that "Jackson '017 merely disclose that another frame rather than a corresponding frame can be used when determining offsets between a cycle and a base cycle, but that does not mean different reference frames are set for each of a plurality of subsequent cycles as a first frame of ultrasound data corresponding to a first portion of the cycle." The 08/08/2007 Final Rejection had

cited Jackson '017 for teaching of *resetting the reference frame of data for each of the plurality of subsequent cycles as a first frame of ultrasound data corresponding to the first portion of the cycle* (col. 6, ll. 5-65; col. 8, ll. 58-67; col. 9, ll. 5-35, 51-65). To clarify, the teaching of Jackson '017 are concerned with relating ultrasound data to a trigger event, where the relation distinguishes between different cycles for determining groupings of frames. That is, ultrasound data is related to a given trigger that corresponds to a beginning or end of the cycle, where the trigger separates the frames of one cycle from the frames of other cycles (col. 6, ll. 10-13, 22-30; col. 9, ll. 2-27). Thus, as it was applied in the 08/08/07 Final Rejection, the modification of the reference frame of Jackson '660 with the resetting of the reference frame of Jackson '017 would have been obvious to distinguish different groupings of frames, as disclosed by Jackson '017 (col. 4, ll. 1-12).

**Regarding the Rejection of Claims 3-5 and 9-11**, Appellant first sets forth an argument stating that the arguments regarding claims 1 and apply to the dependant claims as well. The Examiner stands that these arguments have been addressed in the Examiner's response to Appellants arguments regarding claims 1 and 12 (see above).

Appellant goes on with regard to claims 9, alleging that the combination of Von Behren et al. Jackson '017 and Jackson '660 do not teach or suggest *"determining the first portion as a function of a first reference frame of ultrasound data and a first subsequent frame of ultrasound data"*. In response to Appellant's *first portion* allegation, the Examiner stands that the arguments set forth in the Examiner's response to

Appellants arguments regarding claims 7 and 16 apply equally well with regard to the claim 9 *first portion* limitation (see above). However, the 08/08/07 Final Rejection had relied on Jackson '017 for the limitation *determining the first portion as a function of a first reference frame of ultrasound data and a first subsequent frame of ultrasound data*. That is, the Examiner stands that Jackson '017 teaches identifying a portion of a cycle, even a first portion of a cycle as a function of a first reference frame and a first subsequent frame (col. 5, ll. 21-46; col. 6, ll. 10-13, 42-60; col. 7, l. 53. col. 8, l. 7). Appellant further alleges that there is no teaching or suggestion of a determining for a *breathing cycle*. In response to Appellant's *breathing cycle* allegation, the Examiner stands that the Examiner's stance, outlined in the Examiner's response to Appellants arguments regarding claims 1 and 12 apply equally well with regard to the claim 9 *breathing cycle* limitation (see above).

Appellant further alleges with regard to Jackson '017, that the determining portions of physiological cycles using ECG is not the same as identifying a first portion of a cycle as a function of a cyclic parameter that was calculated from tracked motion of frames. This allegation assumes that ECG is the only means that that Jackson '017 determines portions of a cycle. However, Jackson '017 makes it very clear that the use of ECG is optional and that the cyclic parameter may be determined by the ultrasound data (col. 3, ll. 1-9; col. 4, ll. 49-56; col. 5, ll. 26-35; col. 6, ll. 43-51; col. 8, ll. 58-67; col. 9, ll. 10-35).

Appellant goes on with regard to claims 9 and 10, alleging that there is no teaching or suggestion in the prior art of the step of *repeating the determining step with*

*a different reference frame for each cycle.* The 08/08/2007 Final Rejection had cited Jackson '017 for teaching of *repeating the determining step with a different reference frame for each cycle* (col. 5, ll. 21-46; col. 6, ll. 5-65; col. 8, ll. 58-67; col. 9, ll. 5-35, 51-65). To clarify, the teachings of Jackson '017 are concerned with relating ultrasound data to a cyclical trigger event to distinguish between different cycles for determining groupings of frames. That is, ultrasound data is related to a given trigger that corresponds to a beginning or end of the cycle, where the trigger separates the frames of one cycle from the frames of other cycles (col. 6, ll. 10-13, 22-30; col. 9, ll. 2-27). Here, the Examiner stands that the off-sets of Jackson '017 are determined relative to reference ultrasound data that corresponds to the trigger signal, where the trigger signal separates the frames of one cycle from the frames of other cycles.

Appellant goes on, alleging that the combination of the features of Jackson '017 with Von Behren would not make sense because Von Behren discloses determining phase information for a plurality of spatial locations and determining B-mode variation during a heart-beat and Jackson '017 discloses determining temporal offsets of frames of a cycle with respect to frames of a base physiological cycle. The Examiner stands that this allegation is moot because Jackson '017 was not called upon for the teachings of off sets, but rather Jackson '017 was called upon for the teachings of repeating a determining of a portion of cycle with a different reference frame.

Appellant goes on with regard to claim 11, alleging that it would not make sense to combine Jago et al. with Von Behren, Jackson '017 and Jackson '660 because Jago deals with spatial compounding. Responding to Appellant's allegation, the Examiner

stands the combination of Von Behren, Jackson '017 and Jackson '660 with the morphing of Jago would have been obvious to one of ordinary skill in the art for the purpose reduction of blurring in images caused by inadvertent transducer motion, which is well known in the art.

**Regarding the Rejection of Claims 8,** Appellant first alleges that the arguments regarding claim 7 appropriately apply to the dependent claim as well. The Examiner stands that these arguments have been addressed in the Examiner's response to Appellants arguments regarding claim 7 (see above).

Appellant goes on, alleging that the combination of Von Behren and Sui does not teach or suggest "identifying a minimum of a breathing cycle". Here, the Examiner stands that the determination of a peak and minimum are not distinct processes. That is, the teachings of Sui are capable of determining a minimum of a cycle using the same disclosed phase analysis for determining the maximum. In response to Appellant's *breathing cycle* allegation, the Examiner has already addressed this matter in the Examiner's response to Appellants arguments regarding claims 1 and 12 (see above).

**Regarding the Rejection of Claims 13 and 15,** Appellant alleges that the arguments regarding claim 12 appropriately apply to the dependent claim as well. The Examiner stands that these arguments have been addressed in the Examiner's response to Appellants arguments regarding claims 1 and 12 (see above).

**Regarding the Rejection of Claims 17-21**, Appellant first alleges that the arguments regarding claim 16 appropriately apply to the dependent claims as well. The Examiner stands that these arguments have been addressed in the Examiner's response to Appellants arguments regarding claims 16 (see above).

Appellant goes on alleging that it would not make sense to combine Jago with Jackson '017 and Jackson '660 because Jago deals with spatial compounding. Responding to Appellant's allegation, the Examiner stands the combination of Jackson '660 and Jackson '017 with the morphing of Jago would have been obvious to one of ordinary skill in the art for the purpose reduction of blurring in images caused by inadvertent transducer motion, which is well known in the art.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.  
For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Ellsworth Weatherby/

Conferees:

/Long V Le/  
Supervisory Patent Examiner, Art Unit 3768

/Michael Phillips/  
RQAS